

Project title: **Print Anything @ MU – 3D Printing Technologies on Campus**

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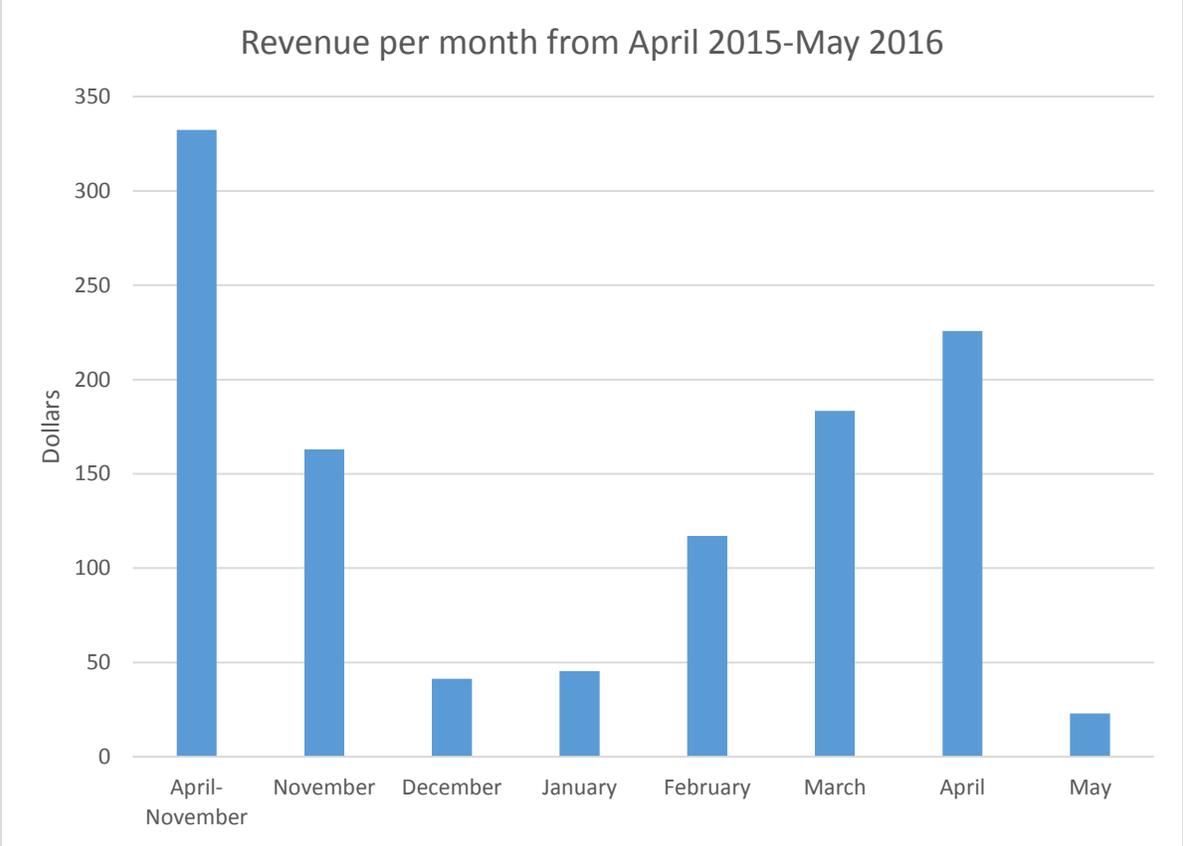
Summary:

The main goal of this project is to pilot 3D printing services to provide easy public use by student body with potential for growth to encompass many different aspects of university life. Afinia brand 3D Printers are purchased and stationed in Ellis Library, for easy access by all students and faculty. 3D print requests are submitted by email, and transactions are handled by student workers. Prints are done in the order that they are received, with priority given to small or single-print orders. Upon completion of the print, the customer receives their order in a timely fashion and provides payment. Through this project, all students and faculty are able to use the technology of 3D printing to improve their academic experiences.

The demand for this service has been gradually increasing ever since its launch in April, as the word has spread and people become more aware of the service. Multiple pricing options were testing, eventually settling on charging \$0.13 per gram, which is a \$.07 markup from the estimated actual cost to buy plastic (\$.06). Original models factored in cost of the workers and their pay, but it was determined that due to the nature of the work and the amount of effort required to man a 3D printer, it would be unsustainable to attempt to put pricing that would account for the worker's pay. This would raise prices too high to be of use to students. This most recent model was established to keep prices low while covering the costs of materials, and allowing for future repair and growth. After collaborating with Missouri S&T as well as Oregon State University, this model was decided on, as it best allows for fair pricing to students. This also is double the cost of the plastic, and should be sustainable to offset the total cost of running the printers.

Data was stored in an online spreadsheet; all current and past orders, as well as their cost, time and plastic usage are recorded. As of May 12<sup>th</sup>, 2016, we have fulfilled 115 discrete orders, raising approximately \$1132 in revenue, using over 8.7 kilograms of plastic. This comes down to around \$566 in profit, since the pricing model only takes into consideration the cost of plastic. On average, print orders averaged \$9.93 in cost to the customer. This data is skewed however, due widely ranging sizes and quantities in orders. Furthermore, over the summer and winter breaks business dropped to virtually nothing due to a lack of orders and student workers to handle transactions. In reality, the service has been running from April 4<sup>th</sup>, 2015 to May 12<sup>th</sup>, 2016, with a total number of operating weeks around 34 and averaging around 3.35 orders each week.

The graph below highlights the increasing popularity of the service, with the initial 8 months compressed into the first entry, followed by each consecutive month's revenue. The drop during December and January is due to winter break. Only one week of operation was performed in May, 2016.



Budget/Expenditures:

<b>IFF Grant</b>			
<b>Resource</b>	<b>Budget</b>	Premium PLA	\$30.00
Printer and Filament	\$4,115.00	Basic ABS	\$32.00
Computer	\$400.00	Premium ABS	\$45.00
Miscellaneous	\$1,000.00	Afinia H-480	\$1,300.00
Staffing (\$8/hour, 20 hour week for 40 weeks)	\$6,400.00	Afinia H-479	\$750.00
Total Starting Balance=	<b>\$11,915.00</b>	Afinia H-800	\$1,900.00
See other documents for itemized expenditures			
Final Ending Balance=	<b>\$3133.63</b>		

Comments: The final balance of 3133.63 is due to several factors; firstly, that all revenue from the service was reinserted into the original account. That accounts for 1132; the remaining \$2000 comes from overestimations for payroll needs, as well as frugality on expenditures. Without staff during the summer or winter breaks, several weeks which were initially planned went without cost, estimated around ~\$640 (the difference between the 40 weeks budgeted and the actual ~34 weeks worked). A laptop computer was acquired to run the printers without cost, so 400.00 went unused. The machines also worked mostly without need for repair, so costs were low in the miscellaneous section.

#### Accomplishments:

- 1) Launched Print Anything @ MU in April, 2015
- 2) Spread awareness through multiple articles written by journalists and other students
- 3) Acquired all necessary hardware to begin 3D Printing services
- 4) Hired student workers for regular hours to provide services
- 5) Developed art and a temporary website
- 6) To date, we have fulfilled 28 individual orders, with a waiting list in place for future orders
- 7) 3D prints have ranged from trinkets (a ring), useful tools for research (mouse brain, 3D representations of earth's gravitational field, mechanical parts), and art (lion statues, personal emblems, etc.)
- 8) Purchased four 3D Printers
- 9) Installed enclosure into library for permanent and public placement
- 10) Created signage to advertise service and information

#### Current/Future tasks:

- 1) Finalize website with online file submission, helpful website links, and instructions
- 2) Create formal instructional materials for eventual job training of future workers – in progress
- 3) Survey Students and advertise to determine awareness of service
- 4) Hand over operations at the end of the program to library staff and educate them on the service – in progress